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Scapholeberis erinaceus Daday, 1903 (Crustacea: Cladocera) at Bátorliget (Hungary)

By

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ABSTRACT. Numerous specimens of all age categories of Scapholeberis erinaceus Daday, 1903 have been collected from a relict mire at Bátorliget. Based on this material various aspects of the taxonomy and morphology of the species are discussed. From the type series a lectotype has been designated.

KEY WORDS: Scapholeberis erinaceus Daday, 1903; taxonomy, morphology, age categories.

Scapholeberis erinaceus Daday, 1903 (= S. echinulata Sars, 1903) is one of the very rare species of Cladocera. It is widely distributed, it is known from scattered localities in SW-Siberia, Kazakhstan, Ukraine (SARS 1903, MANUILOVA 1964), Poland (JERZMANSKA 1953), Czechoslovakia (HUDEC 1983), Romania (NEGREA 1987) and Hungary (GULYÁS 1974, HOLLWEDEL 1984) (Fig. 1). In this paper we accept the nomenclature proposed by FLÖSSNER (1984).

In summers 1985 and 1986 qualitative zooplankton samples were taken from small water-bodies of the relict mire at Bátorliget, one of the oldest Hungarian nature conservation areas. In both years, we found a great number of S. erinaceus specimens. In addition to this material we had the opportunity to investigate original specimens of this species from the DADAY collection. In this paper we present: the designation of lectotype; description and analysis of the Bátorliget material, and discussion of the validity of S. echinulata kerteszi Ponyi, 1955.

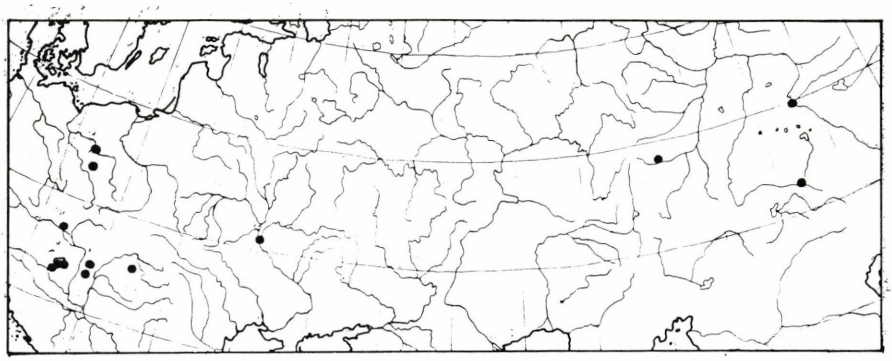

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Fig. 1. Distribution of Scapholeberis erinaceus Daday, 1903

DADAY's original material - collected at Balatonkeresztúr, Kéthely and Fonyód - consists of four vials, deposited in the Zoological Department of the Hungarian Natural History Museum. Holotype has not been designated, thus we selected one of the parthenogenetic females from the vial labelled: "Scapholeberis erinaceus Daday, Fonyód, VANGEL, 1212/1902, Typus, Collectio Dadayana, Cladocera II-330" as the lectotype. This particular specimen has been chosen because of its relatively good condition, in spite of the fact, that its postabdomen is not visible (all specimens with produced postabdomen being damaged) and its body measurements differ from those given in the original description. This disparity is common to all members of the type-series and is certainly due to post-mortem shrinkage caused by fixatives. Our measurements of the lectotype, and those given by DADAY (1903) for all his material, are given in Table 1.

The Bátorliget material was collected on 14, 16, and 19 August 1985, and on 13 July 1986 in a temporary, shallow, muddy pool, populated mostly by sedges, Carex spp.; a detailed description of the sampling stations, as well as of the Bátorliget relict mire in general, is given by LEGÁNY (1984) who is the same person as the first author of the present paper. A plankton net of 21 µm mesh size was used, the material was fixed immediately in formaldehyd (ca 5% solution). We have found 8 parthenogenetic females and 36 juveniles in 1985, and 23 parthenogenetic females, 22 ephippial females, and 2 juveniles in 1986. This relatively rich material enabled us to compare the morphology of various age categories and the two forms of adult females. The scheme of measurements is shown in Fig. 3.

Samples usually contain only females, only MANUILOVA (1964) and HOLLWEDEL (1984) found males in Siberian and Hungarian materials, respectively. Unfortunately, they compared their specimens merely with adult females, but they did not mention any characters distinguishing the males from juveniles, which differ from adult females exactly as described for the specimens in question. We had the possibility to study the male specimen found by HOLLWEDEL (1984); the claw of the first thoracic leg (Fig. 2) proved to be very distinctive in S. erinaceus, too. Some differences in body shape (dorsal line is more straight) also seem to distinguish adult males from older (5. instar) female juveniles, but this remains to be confirmed by studying a more representative sample.

We found several differences between the morphology of parthenogenetic and ephippial females. In ephippial females (Fig. 4) the dorsal part of testa is deeply longitudinally depressed along the midline from the distinct hump just behind the head to the almost completely obliterated dorsoposterior angle, in the parthenogenetic form (Fig. 5) there is no signe of an anterior hump. The dorsal surface is strongly convex without any depression, and the dorsal line meets the posterior margin in a distinct, protruding angular protuber-

Fig. 2. Scapholeberis erinaceus Daday, 1903
Male, first leg, from Hollwedel's material

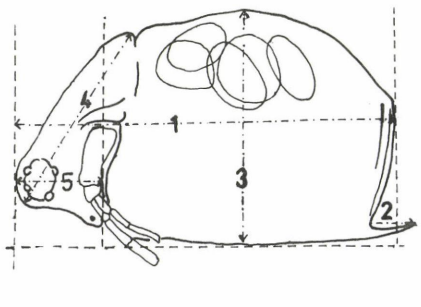


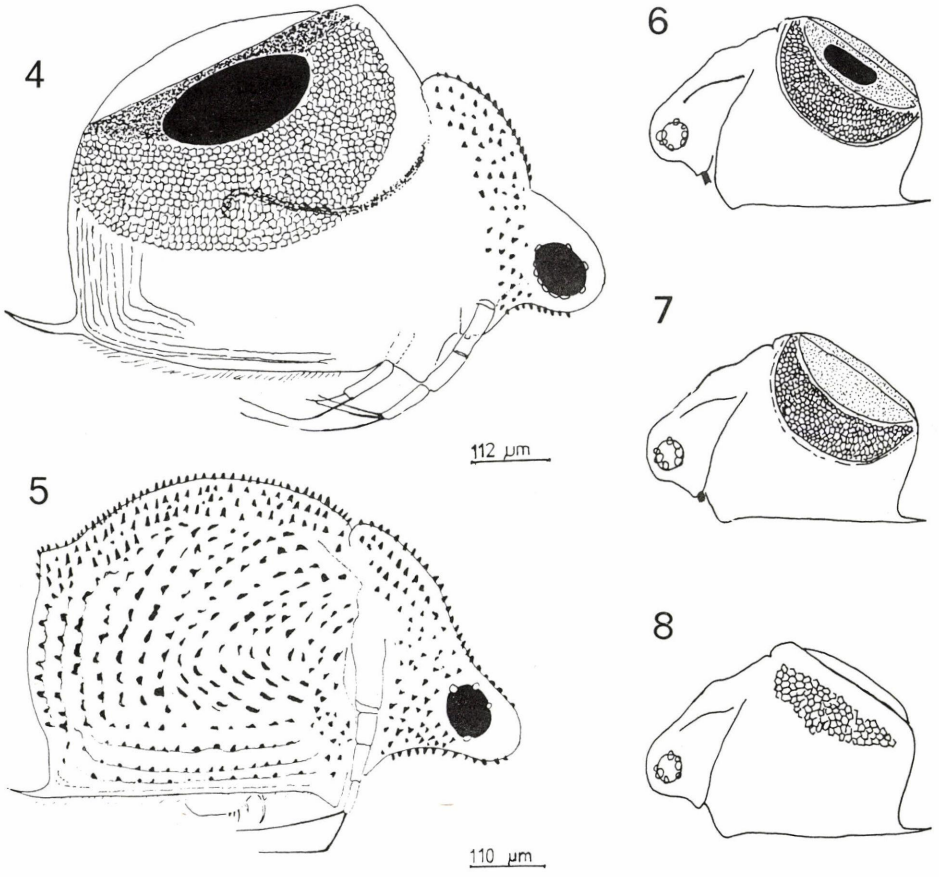
Fig. 3. Scheme of measurements
1= total body length; 2= length of mucro; 3= maximal height of body; 4= length of head A; 5= length of head B; diameter of eye is the mean of long and short axes

Table 1.

Measurements of the lectotype (original), and the range of variability of the type series (after DADAY 1903) in µm*

	Lectotype	Type series
Total length of body (without mucre)	921	900-930
Length of mucre	111	
Maximal height of body	508	550-580
Length of head A	492	
Length of head B	254	
Diameter of eye	49	

*The measurements for this paper have been done with a scale of one division equal to 0.1 mm and a 6.3x objective, so the real accuracy of the given values is ca ± 8 µm.



Figs 4-8. Scapholeberis erinaceus
4= ephippial female; 5= parthenogenetic female; 6-8: forms of ephippials females; 6= "egg-bearing" form; 7= "egg-bearing" form without egg; 8= "barren" form

ance. Besides these differences ephippial females of this species show other striking peculiarities: valves almost perfectly smooth; the spinules are confined to the head, whereas they cover the whole body in juveniles and parthenogenetic females. Some statistical differences in overall size (Fig. 16) also seem to be detectable. Ephippial females are slightly bigger on the average.

An interesting variability can be observed among the ephippial females. Some specimens show strong pigmentation and coarse polygonal reticulation of the ephippial area; they may (Fig. 6) or may not (Fig. 7) contain eggs. In others - with the same shape - pigmentation is much lighter and sculpture (though still conspicuous) is much finer (Fig. 8); they nev-

Table 2.

Accompanying Cladocera species in various localities of Scapholeberis erinaceus Daday

	KN	PN	CJ	HÁ	HB
Sida crystallina (Müll.)		+			
Diaphanosoma brachyurum (Liév.)		+			
Daphnia curvirostris EYLM.			+		
pulex LEYD.				+	
longispina MÜLL. [a]	+	+	+		+
Simocephalus exspinosus (Koch) [b]	+		+	+	+
vetulus (Müll.)			+	+	
vetuloides	+				
Moina rectirostris (Leyd.)	+				
Ceriodaphnia reticulata (Jur.)	+	+	+	+	+
megops SARS [c]	+				
laticaudata (Müll.)				+	
quadrangula (Müll.)	+	+			
Megafenestra aurita (Fischer)	+		+	+	
Scapholeberis rammneri Dum. Pens. [d]				+	
mucronata (O.F. Müll.)	+	+			
Acroperus harpae (Baird) [e]	+				
Tretocephala ambigua (Lillj.)	+		+		
Craptoleberis testudinaris (Fisch.) [f]					(+)
Alona guttata SARS		+			
costata SARS	+				
rectangula SARS		+			
Dunhevedia crassa KING [g]	+				
Alonella excisa (Fisch.)			+	+	
exigua (Lillj.)		+			
Pleuroxus aduncus (Jur.)	+	+		+	
trigonellus (Müll.)				+	
Chydorus sphaericus (Müll.)	+		+	+	+
Bosmina longirostris (Müll.)		+			

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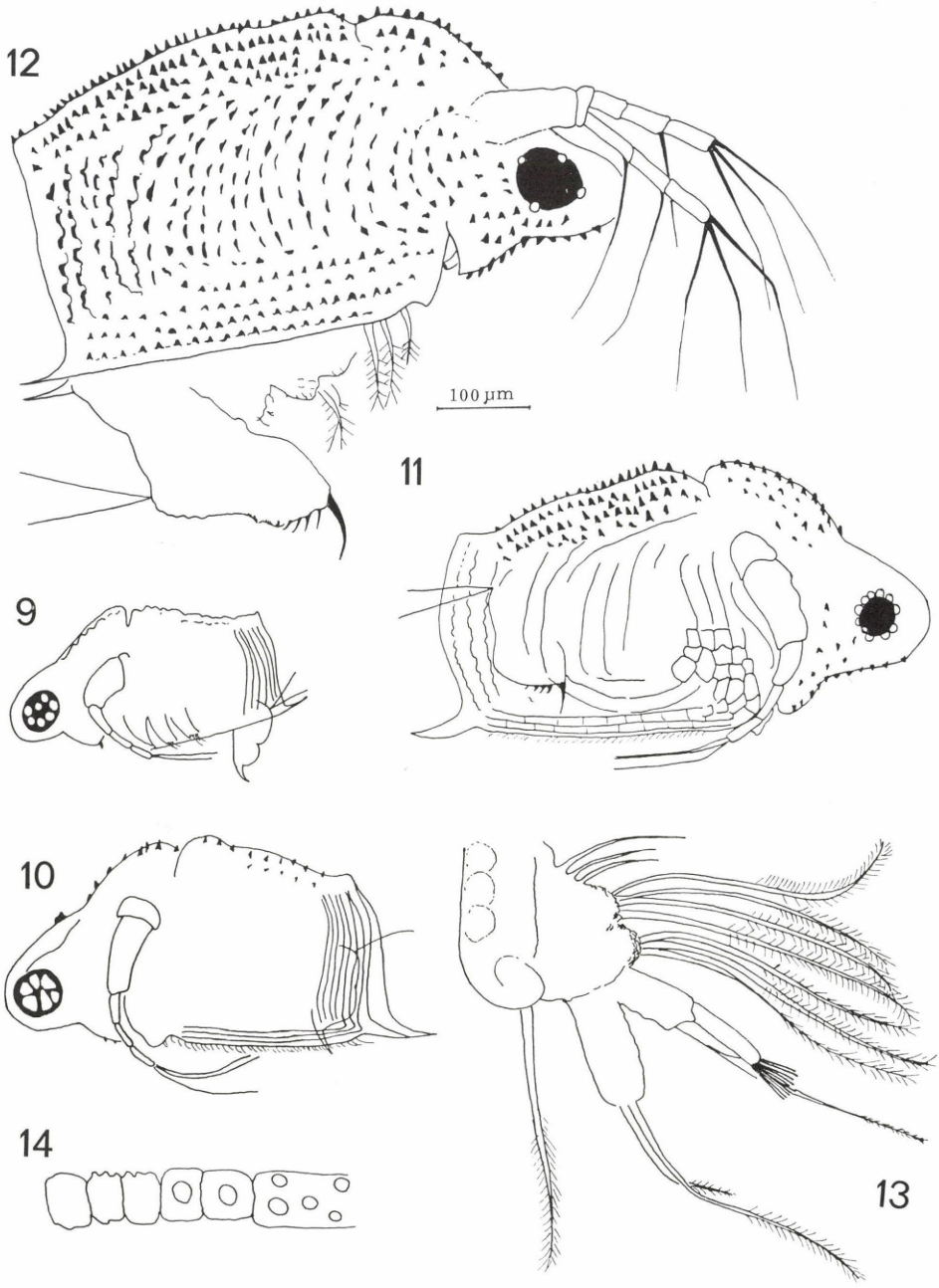
a) reported from KN as D. leydigi;
b) reported from KN as S. productus;
c) reported from KN as C. megalops;
d) reported from HÁ as S. kingi;
e) reported from KN as A. neglectus;
f) only 1 testa found;
g) reported from KN as D. setigers; KN - Kazakhstan; lake Noraibek (SARS 1903); PN- Poland: lake Niezgoda (JERZMANSKA 1953; CJ - Czechoslovakia: Jursky Sur (HUDEC 1983); HÁ - Hungary; Ágasegyháza (HOLLWEDEL 1984); HB - Hungary: Bátorliget (present report)



Figs 9-14. Scapholeberis erinaceus: female instars
9= 2. instar larva; 10= 3. instar larva; 11= 4. instar larva; 12= 5. instar larva; 13= 5. instar female larva, first leg; 14 = ovarium

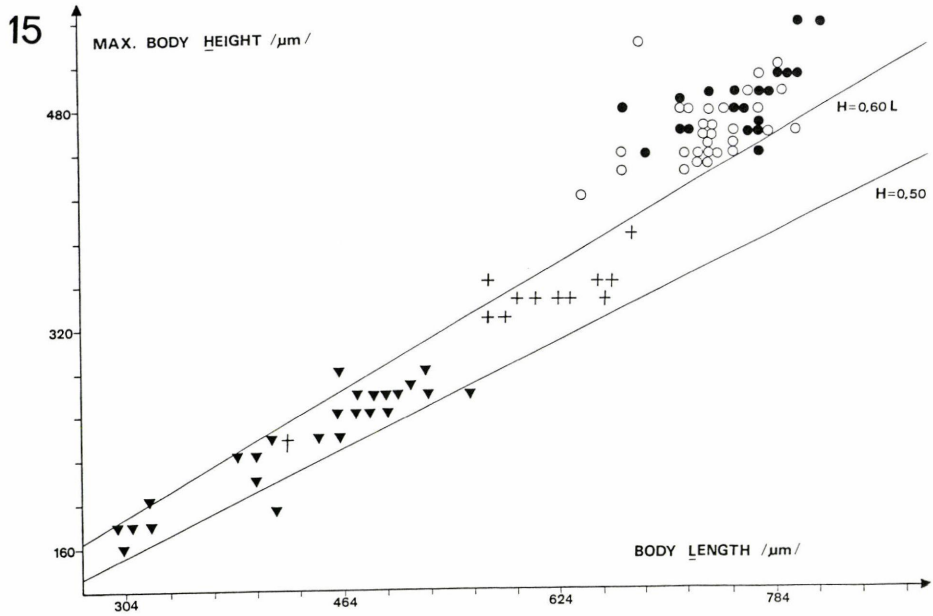


Fig. 15. Relationship between the length and height of body
(▼ = 2., 3. and 4. instars; + = 5. instar; O = parthenogenetic females; ● = ephippial females; ┼ = male from Hollwedel's material; see also footnote of Table 1.)

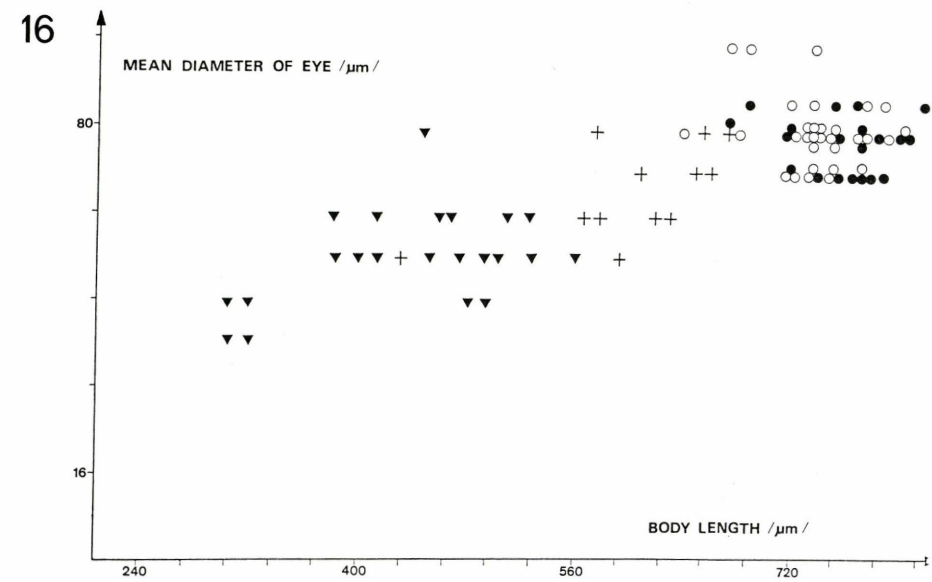


Fig. 16. Relationship between diameter of eye and length of body. Symbols as in Fig.15; see also footnote of Table 1.

er contain eggs. These two forms may correspond to the "egg-bearing" and "barren" ephippial females, described in Chydorus biovatus by FREY (1985); alteration of egg-bearing and "recovering" instars in Scapholeberis mucronata (O.F. Müller) and S. kingi (= S. rammneri Dumont and Pensaert) were reported by RAMMNER (1929).

In parthenogenetic females, the number of eggs (or embryos) is correlated with size (Fig. 17).

Juveniles (Figs 9-12) are not only smaller, but also more elongated than mature females. Fig. 15 shows juvenile clusters - around 310, 400, 490, and 600 µm in length- which correspond to the 2.-5. instars; the first instar (not shown on the figure) is represented in our material by the two smallest juveniles (240-250 µm). The 4. and 5. instars are the same in size as males, so it is easy to mix them up. The presence of ovaries and the first leg, as shown in Figs 13-14 in specimens of the last three clusters make the identification of our material as juvenile females firmly established.

Males have not been found in our material. Even the sample of 1986 - where ephippial females occurred in relatively great number - did not contain any males. The only two specimens other than adult females, were proved to be 5. instar females.

An interesting point is the variation in eye-size (Fig. 18). It increases with ontogenetic phases in juveniles. In females it is bigger, than in juveniles, but it does not vary consistantly with body size among adult females, nor between parthenogenetic and ephippial females.

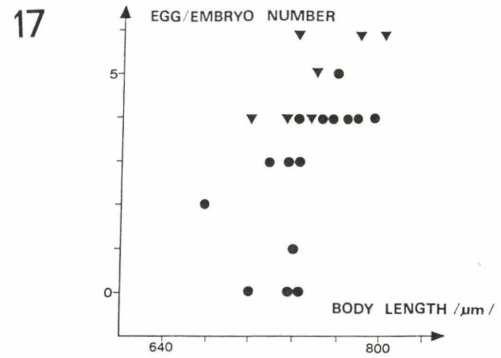


Fig. 17. Relationship between body length and number of eggs or embryos
(▼ = eggs; ● = embryos)

We have examined the characters used by PONYI (1955) (shape of outgrowths, their presence or absence over the eye area, curvature of mucro, angularity of postabdomen) to separate S. echinulata kerteszi Ponyi. As it was shown by JERZMANSKA (1953) and HUDEC (1983), the shape of outgrowths shows great variability from "spicules" (sometimes bicuspidate) to flat lamellae (cf. HUDEC 1983: Fig. 5). There are differences in the outgrowths of individuals of the same region. In the Bátorliget population there is a great individual variation in the pattern of area covered by spinules. In some specimens (Fig. 1. in PONYI 1955) the spinules occur only on the uppermost third of the head. In others (Figures 24 and 26 in DADAY 1903) only a small area just before the eyes is free of spinules. Most specimens are in between these two extremes. Regarding mucro, it is sometimes straight, sometimes strongly incurved, but usually slightly bent (see also Figs XV, 1 and XV, 5 in DUMONT and PENSAERT 1983). The characters used by PONYI (1956) can occur in free combinations, so they are taxonomically worthless. So is the angularity of postabdomen. It is difficult to define this feature. One of the possible interpretations could be the angle between the extrapolation of the "idealized" dorsal margin of postabdomen and the line connecting its dorso-

posterior angle with the base of claw. The drawings published by DADAY (1903) (S. erinaceus Daday), PONYI (1955) (S. e. kerteszi Ponyi) and DUMONT and PENSAERT (1983) (Fig. XV, 3 - S. echinulata Sars) suggest, that regarding this character (α) S. e. kerteszi Ponyi ($\alpha = 68^{o}$) differs from S. erinaceus Daday ($\alpha = 52^{o}$) and S. echinulata Sars ($\alpha = 54^{o}$). On the other hand if one compares Fig. XVI, 1 in DUMONT and PENSAERT (1983) ($\alpha = 73^{o}$) with Fig. 6 ($\alpha = 52^{o}$) in HUDEC (1983) - both showing specimens from the same population - the uncertainty of this character is obvious. Apparently, more or less "angular" aspect of postabdomen depends largely upon the degree of stretch, so the comparison of populations is probably meaningless. Considering both morphological and zoogeographical argument (i. e. the unlikely existence of a distinct subspecies in Farmos (Middle Hungary) surrounded by the very widely distributed nominate race) we also consider Scapholeberis echinulata kerteszi Ponyi, 1955 a synonym of Scapholeberis erinaceus Daday, 1903.

S. erinaceus Daday is an inhabitant of shallow, muddy, temporary waters with usually dense vegetation. A comparison of the published lists of accompanying species of Cladocera (Table 2) shows, that some of them occur almost consistently together: Ceriodaphnia reticulata (Jurine) appears in all the five lists, Daphnia longispina (O. F. Müller), Simocephalus exspinosus (Koch) and Chydorus sphaericus (O. F. Müller) in four (all these species - and only these - have been found in our samples, too), Megafenestra aurita (Fischer) and Pleuroxus aduncus (Jurine) in three; simultaneous occurrence of these cladocerans - or most of them - can be a useful guide in searching for S. erinaceus Daday (accompanying species of Copepoda at Bátorliget were Metacyclops gracilis (Lilljeborg, 1853) Thermocyclops dybowskii (Lande, 1890), Megacyclops viridis (Jurine, 1820) and Macrocyclops fuscus (Jurine, 1820). (Striking paucity of Cladocera species in our material is partly due to the fact, that we list only those found within the specific sampling plot (less than one square meter), while the data of other authors obviously refer to greater areas).

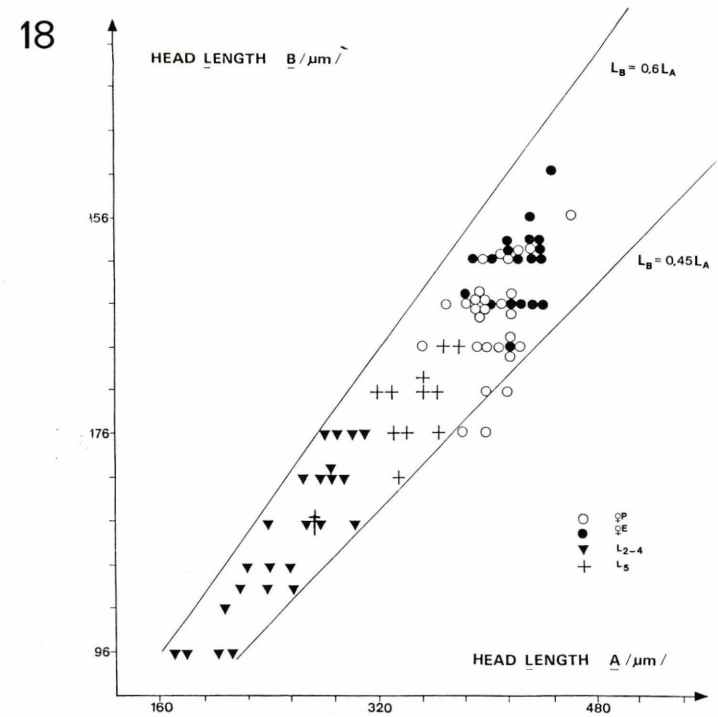


Fig. 18. Relationship between head lengths A and B. Symbols as in Fig.15; see also footnote of Table 1.

Bátorliget is the sixth locality of S. erinaceus Daday in Hungary; together with one in Czechoslovakia it means seven localities in the Carpathian Basin, as compared to seven from all the rest of the species' huge geographical area. This may reflect real pecularities of its distribution, but more probably is the result of insufficient data. We hope, that our discussion on taxonomy, morphology, habitat, and accompanying fauna of S. erinaceus Daday complements the papers of previous authors and helps future researches.

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